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17. ABSTRACT (MAX. 250 WORDS) The satisfaction of the basic requirements of educational television by the establishment of the Instructional TV Fixed Service was discussed.

The basic requirements of educational television were that the cost per student or per student hour of instruction had to be economical, that a very large number of students had to be served, that the system had to be capable of teaching subjects simultaneously, and that the system had to be locally controlled.

The only previously available methods for distributing instructional television material to many schools involved standard television broadcasting channels or interconnecting cable facilities, neither of which was satisfactory. Based on the success of the Plainedge, New York school district demonstration system, which was an on-air closed-circuit system interconnecting the district's high school, junior high school, and elementary schools, the F.C.C. established an instructional TV Fixed Service. The TV Fixed Service permitted the operation of low-power television broadcasting systems in the 2500 to 2690 megacycle frequency range.

A description of the Plainedge system indicated how a typical installation operated. Studies showed how such systems could fill the instructional television requirements of small, medium, and large school districts as well as colleges and universities. A single channel system serving all public schools in a very large city could cost two dollars per pupil, with an additional channel bringing the cost up twenty-five cents per pupil. Only a consideration of such factors as size and terrain of an area, location and number of schools, and channel requirements could provide valid cost information for school districts.

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Educational Television

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INSTRUCTIONAL TECHNOLOGY - U.S.C.
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ON-AIR, CLOSED-CIRCUIT INSTRUCTIONAL TELEVISION THE 2500 MEGACYLE BAND

by

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Adler Electronics, Inc.

Delivered at the Third Annual Conference On Educational Television, Fordham University, Bronx, New York, August 21, 1963.

Approval by the Federal Communications Commission, on July 25th, of the new instructional television service may well make TV as familiar a teaching tool as textbooks during the next five years.

Up until this point, the educator - and I mean the classroom teacher and school administrator - has watched from the side-lines as commercial Broadcasting and area-type ETV stations developed and grew to serve their respective audiences. Except for a few scattered forays into closed-circuit operations, and limited access to the facilities of the large broadcast stations, our educators could only dream and plan how they would use this powerful medium to enhance the education of their students.

Based on the experience of the commercial Broadcaster, the educational Broadcaster, the educator and the student, television could provide the greatest boost to the educational process since the invention of the printing press. The strong desire of the educator to utilize television for classroom instruction was thwarted right from the start. That all too familiar thwarter of strong desires, money, was one key stumbling block. An even greater hurdle was the unavailability of TV channels for this type of service. The F.C.C., spearheaded by Commissioner Lee and numerous educators, combined to eliminate all of the barriers to the development of a workable instructional TV system.

In order for instructional television to become a feasible, widely-accepted reality, educators have set three basic requirements.

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REQUIREMENTS FOR EDUCATIONAL TELEVISION

The first is that the cost per student or per student hour of instruction be economical. Since many of the costs involved in the development and operation of a high quality instructional TV program are fixed and relatively high, it is essential to serve a large number of students. Typical of the costs independent of the number of students are preparation and presentation of the program and classroom material, operation of the TV studio, and time of the TV teacher. It is obvious why these costs must be distributed over a substantial number of students.

The second basic requirement for an instructional TV system is a capability for simultaneous teaching of several subjects. The variety of subjects and grade levels in our schools makes the multiple channel requirement imperative.

The third requirement is that educators maintain local control of programs in accordance with the established tradition of local school districts and special school systems. Since each locality, student body, curriculum, and time schedule is unique, local control of instructional television is as important as local control of other facets of an educational program. An instructional TV system that covers too many districts may serve no one well.

In summary, to fulfill the educators' basic needs, an instructional TV system had to be devised that would be capable of serving large numbers of students, often in widely dispersed school buildings, on a multiple channel basis, and at costs within the means of most school districts and universities.

The only previously available methods for distributing instructional television material to a number of school buildings involved the use of standard TV broadcasting channels, or of interconnecting cable facilities. The pressing need for additional standard VHF and UHF channels by commercial and educational broadcasters, coupled with the limited number of such frequencies, made it impossible to assign a number of frequencies to the same local area for instructional use. While a cable system, either privately owned or leased from a common carrier, has the required multichannel capability, its cost increases sharply with distance and additional receiving points and soon exceeds the bounds of economic feasibility.

More than two years ago the F.C.C. undertook a program to make low cost, multi-channel systems available to educators for instructional television. Early in 1962, a demonstration system was installed in the 10,000 student Plainedge, New York, school district which covers portions of Bethpage, Farmingdale, North Massapequa and Seaford. This on-air, closed-circuit system interconnected the district's high school with its junior high school and six elementary schools.

Based on the success of the Plainedge System, which was used throughout the school year on a regular basis, and the wide acclaim it received from educators, the F.C.C. established the new instructional TV Fixed Service. Essentially this service permits the operation of low-power, TV Broadcasting systems in the 2500 to 2690 megacycle frequency range. As far as the educator is concerned, the result is standard live, film or videotape programs on up to ten simultaneous channels, transmitted on a special set of frequencies.

THE PLAINEDGE ETV SYSTEM

A brief description of the Plainedge system will indicate how a typical installation operates. At Plainedge, a standard TV studio had been installed in the High School, and all of the school buildings had internal distribution systems. A ten watt, 2,000 megacycle transmitter was installed at the high school and receiving converters and antennas, the only equipment required, were installed at each of the other seven schools. The 2,000 megacycle receiving units are similar to high quality UHF converters, and they change the 2,000 megacycle signal to a standard VHF television signal which is fed directly into the building's distribution system, or into a standard VHF TV set. All that a classroom teacher has to do is to tune the set in the classroom to the appropriate VHF channel to receive the selected instructional TV program.

Because the district is long and narrow in shape, a bi-directional transmitting antenna composed of an array of 8 simple corner reflectors was used. The result was an effective radiated power of 136 watts in each direction. The style of receiving antenna at each school depended on its distance from the transmitter site. At nearby schools, simple corner reflectors were used. At more distant schools, arrays of two corner reflectors were used; and at the furthest location a 4 foot para-bolic antenna was utilized. The complete system was carefully engineered to obtain excellent reception at all seven schools.

During the past year we have prepared numerous studies showing how on-air, closed-circuit systems can effectively fill the instructional TV requirements of small, medium and large school districts and colleges and universities. Since each system must of necessity be designed to meet the unique requirements of an individual user, costs vary widely.

Our studies have shown that a single channel system serving all of the public schools in a very large city can cost as little as $2.00 per pupil. An additional channel would bring the cost up 25¢ to $2.25 per pupil. In smaller districts the costs will be higher. Again, it must be emphasized that only a study which considers such factors as geographic size and terrain of an area, location and number of schools and channel requirements can provide valid cost information.

Now that the "Instructional TV Fixed Service" has made multiple channels and low cost systems a reality, we will undoubtedly witness unprecedented development in the pedagogical and technical aspects of classroom TV. Judging by the extensive educator interest, we can expect that by the end of this decade, most school districts, colleges and universities will be utilizing instructional TV in their curriculums.